

REMARKS

Claims 22-24, 26, 28-31 are pending in the application. Claims 30 and 31 were previously added, but the Office Action does not indicate in the Summary or on pages 2-4 that such claims were considered. As such, the Office Action is incomplete and Applicant requests replacement of the Office Action with another indicating consideration of all pending claims.

Claims 22-24, 28, and 29 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Chi in view of Schugraf. Applicant requests reconsideration.

Claim 22 sets forth a capacitor construction including, among other features, an opening in an insulative layer over a substrate, a hemispherical grain polysilicon layer, a first capacitor electrode containing TiN, a capacitor dielectric layer, and a second capacitor electrode. Pages 2-3 of the Office Action allege that Chi substantially discloses the limitations of claim 22 except for the first capacitor electrode containing TiN and relies upon Schugraf for the missing subject matter. Page 3 of the Office Action alleges it would be obvious to substitute oxidized HSG in Chi with unoxidized HSG from Schugraf as a substitution of materials recognized in the art as equivalent. Applicant traverses on the grounds that Chi fails to disclose and Schugraf fails to properly suggest a capacitor construction that includes a hemispherical grain polysilicon layer along with the other structural features of a capacitor construction, as set forth in claim 22.

Page 2 of the Office Action recognizes that column 3, lines 4-13 of Chi expressly requires complete oxidation of HSG silicon 203 along with amorphous silicon sidewall spacers 201. However, page 3 of the Office Action alleges that clusters 20b formed in Schugraf by annealing polysilicon layer 20 constitute an unoxidized HSG polysilicon layer, as claimed. Page 3 of the Office Action further alleges clusters 20b in Schugraf are recognized in the art as equivalent to fully oxidized HSG silicon nodules 203 in Chi.

Applicant asserts that the Office Action fails to support the allegation of art recognized equivalence with any evidence. Also, the teachings of Chi expressly state that the allegedly equivalent materials differ in that the fully oxidized HSG silicon nodules 203 provide a much expanded surface area in comparison to unoxidized HSG silicon.

Column 3, lines 8-10 of Chi state that "oxidation of the HSG silicon nodules 203 results in a roughened surface due to volume expansion during the oxidation." The volume difference between unoxidized and oxidized HSG silicon nodules 203 may be appreciated by comparing such nodules displayed in Fig. 3 as opposed to Fig. 4 of Chi. Column 3, lines 24-28 further state that the roughening, by fully oxidizing HSG silicon nodules 203, provides "a much expanded surface area due to the roughness." The volume expansion resulting from the oxidation directly produces the much expanded surface area. Thus, the teachings of Chi include art recognized non-equivalence between oxidized and unoxidized HSG.

Also, the mere fact that the prior art can be modified does not make the modification obvious "unless the prior art suggested the desirability of the modification." In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Accordingly, if a proposed modification of the prior art would render the prior art device or process "inoperable for its intended purpose" or change the principle of operation of the prior art invention being modified, then no suggestion or motivation exists to make the proposed modification. Id.; In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959); MPEP § 2143.01. Regardless of whether it may be possible to substitute fully oxidized HSG silicon nodules 203 of Chi with clusters 20b of Schugraf, such substitution renders Chi inoperable for its intended purpose of providing "much expanded surface area," such as shown in Fig. 4 compared to Fig. 3. At least for such reason, no motivation exists to make the proposed substitution.

Applicant asserts that neither Chi nor Schugraf disclose or suggest a capacitor construction that includes a hemispherical grain polysilicon layer along with the other structural features of the capacitor construction set forth in claim 22. The cited references further fail to suggest or establish a proper motivation to modify the teachings of the cited combination to provide the claimed capacitor construction. At least for such reasons, claim 22 is patentable over Chi in view of Schugraf. Claims 23, 24, and 30 depend from claim 22 and are patentable at least for such reason as well as for the additional limitations of such claims not disclosed or suggestion.

Claim 28 sets forth a capacitor construction that includes, among other features, an opening in an insulative layer over a substrate, a HSG polysilicon layer, a first capacitor electrode containing TiN, a capacitor dielectric layer, and a second capacitor electrode. As may be appreciated from the discussion above regarding the deficiencies Chi and Schugraf as applied to claim 22, the cited combination fails to disclose or suggest the claimed HSG polysilicon layer in a capacitor construction. Accordingly, claim 28 is patentable over Chi in view of Schugraf. Claims 29 and 31 depend from claim 28 and are patentable at least for such reason as well as for the additional limitations of such claims not disclosed or suggested.

Claim 26 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Chi in view of Schugraf as applied to claims 22-24 above, and further in view of Hwang (U.S. Patent No. 6,207,561). Applicant traverses. Claim 26 depends from claim 22, the subject matter of which is discussed above. Hwang does not disclose or suggest and is not alleged to disclose or suggest the subject matter of claim 22 missing from Chi in view of Schugraf. At least for such reason, claim 26 is patentable over the cited combination.

Applicant herein establishes adequate reasons supporting patentability of claims 22-24, 26, and 28-31 and requests allowance of all pending claims in the next Office Action.

Respectfully submitted,

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